REMARKS

In the Final Office Action, the Examiner rejected claims 1-2, 4, 8, 11-14, 16, 19-20, and 22-34. The present Response neither amends nor cancels any claims. In view of the following remarks, Applicants respectfully request reconsideration and allowance of all pending claims.

Claim Rejections under 35 U.S.C. § 112, First Paragraph

Claims 8, 29, and 30 were rejected by the Examiner as failing to comply with the written description requirement set forth under 35 U.S.C. § 112, first paragraph. Applicants respectfully traverse this rejection.

Legal Precedent

First, regarding the written description requirement, the initial burden of proof regarding the sufficiency of the written description falls on the Examiner. Accordingly, the Examiner must present evidence or reasons why persons skilled in the art would not recognize a description of the claimed subject matter in the applicant's disclosure. *In re Wertheim*, 541 F.2d 257, 262, 191 U.S.P.Q. 90, 96 (C.C.P.A. 1976). The Examiner is also reminded that the written description requirement does not require the claims to recite the same terminology used in the disclosure. The patentee may be his own lexicographer. *Ellipse Corp. v. Ford Motor Co.*, 171 U.S.P.Q. 513 (7th Cir. 1971), *aff'd.* 613 F.2d 775 (7th Cir. 1979), *cert. denied*, 446 U.S. 939 (1980). Moreover, any information contained in any part of the application as filed, including the specification, claims and drawings, may be added to other portions of the application without introducing new matter. Accordingly, if an application as originally filed contains a claim disclosing material not disclosed in the remainder of the specification, the applicant may amend the specification to include the claimed subject matter. *In re Benno*, 768 F.2d 1340, 226 U.S.P.Q. 683 (Fed. Cir. 1985).

Independent Claim 8

Independent claim 8, as amended by the previous Response, recites, *inter alia*, "accessing stored image data from a memory, the stored image data defining an input image previously

acquired by an imaging system using a first pixel sampling rate" and "*determining a second pixel sampling rate* for the image data, wherein *the second sampling rate is a desired sampling rate*." (Emphasis added). In setting forth the present rejection, the Examiner alleged that the recited "first pixel sampling rate" and the recited "second pixel sampling rate" constitute new matter not supported by the specification. *See* Final Office Action, pages 6-7. Applicants respectfully disagree.

With reference to Fig. 3 of the present application, Applicants note that the illustrated system 68 includes a module 78 configured to determine the actual sampling rate of an input image 70. *See* Application, page 6, line 28 – page 7, line 12; Fig. 3. As the Examiner will appreciate, the actual sampling rate represents the sampling rate at which the input image 70 was originally acquired, and thus constitutes and provides support for the recited "first pixel sampling rate" of independent claim 8. The system 68 further includes a module 76 for determining an optimal sampling rate, thus providing support for the recited "second pixel sampling rate … wherein the second pixel sampling rate is a desired sampling rate." The application further states that an appropriate shrink parameter may be determined based upon the actual sampling rate (first pixel sampling rate) and the optimal sampling rate (second/desired pixel sampling rate). These teachings support the additional recitation "calculating a shrink parameter as a ratio of the *first pixel sampling rate to the desired sampling rate*." (Emphasis added). Therefore, contrary to the Examiner's assertions, Applicants submit that all the recitations set forth in independent claim 8 are fully supported by the specification.

Dependent Claim 29

Claim 29, which depends from independent claim 1, recites "wherein processing the image data does not comprise shrinking the input image if the pixel sampling rate is less than the desired sampling rate." (Emphasis added). In other words, claim 29 further requires that the shrinking of the input image recited by independent claim 1 is *not* performed if the pixel sampling rate of the recited image data is *less* than the desired sampling rate. Applicants respectfully traverse the Examiner's assertion that this subject matter is not supported by the specification.

As those skilled in the art will appreciate, when the sampling rate of an image is *less* than an optimal sampling rate, such as the Nyquist sampling rate, it *would not* be desirable to shrink the image. In particular, Applicants note that the specification clearly states:

> The present technique employs a more rigorous approach in which the amount of sub-sampling done to shrink the input image depends upon the intrinsic spatial resolution of the image. In the present context, it may be considered that the inherent spatial resolution may depend on the point-spread function of the imaging system acquiring the image data and the sampling rate used to generate the discrete image. As described below, such information is used to determine the optimal sampling rate, which may be defined as the Nyquist rate of the imaging system. This value is used to determine the amount of sub-sampling or shrinking that is to be performed on the image prior to applying the spatial domain operations. The approach ensures that the optimal sampling criteria are not violated by under-sampling and that the maximum amount of sampling can be attained without loss of image information to perform filtering on the image with normalized resolution and to exploit redundancies in the image data.
>
> Application, page 6, lines 19-26. (Emphasis added).

In other words, the specification makes it clear that the application of a shrinking operation to an image that is *already* under-sampled (*e.g.*, sampled at less than an optimal or desired rate, such as the Nyquist rate) may result in loss of image data in the resulting shrunken image and may thus be undesirable in the context of image processing. Thus, contrary to the Examiner's assertions, Applicants submit that one skilled in the art will readily appreciate that not shrinking an input image if the pixel sampling rate is less than the desired sampling rate, as recited by dependent claim 29, is supported by the specification.

Dependent Claim 30

Claim 30, which depends from independent claim 8, recites "wherein processing the image data does not comprise shrinking the input image defined by the image data if the shrink parameter

is less than one." Applicants also respectfully traverse the Examiner's assertion that the subject matter recited by this claim is not supported by the specification.

First, referring to the above discussion, independent claim 8 recites "calculating a shrink parameter as a ratio of the first pixel sampling rate to the desired sampling rate," wherein the first pixel sampling rate represents the actual sampling rate of an input image (*e.g.*, 70) and the second or desired sampling rate represents an optimal sampling rate. Claim 8 further recites "shrinking the input image ... based at least partially on the shrink parameter only when the shrink parameter is greater than one." (Emphasis added). As one skilled in the art will appreciate, where the shrink parameter is calculated as a ratio of the actual sampling rate to the optimal sampling rate, as expressed by the equation S_P/S_O (wherein S_P represents an actual sampling rate and S_O represents an optimal sampling rate) on page 11 of the specification, a ratio that is greater than one would indicate that the actual sampling rate is *greater* than the optimal sampling rate, thus representing a scenario in which the input image is "sampled at a *higher* rate than the optimal rate, such that additional sampling can be done without losing image information." *Id.* at page 11, lines 1-4. Accordingly, a ratio of the actual sampling rate to the optimal sampling rate that is less than one, as recited by dependent claim 30, would likewise indicate that the actual sampling rate of the input image is *less* than the optimal or desired sampling rate. As discussed above, under such circumstances, the input image may be considered as *already* under-sampled and is thus an undesirable image candidate on which to apply a shrinking process due to the potential for loss of image data in the resulting shrunken image. Applicants submit that those skilled in the art, upon reading the present application, will clearly appreciate that when a shrink parameter calculated as a ratio of an actual sampling rate to a desired sampling rate is determined to be less than one, this value provides an indication that an input image is already under-sampled, and thus should not be shrunk in accordance with the present technique. Therefore, contrary to the Examiner's assertions, Applicants respectfully submit that not shrinking an input image if the shrink parameter is less than one is fully supported by the specification.

For at least the foregoing reasons, Applicants respectfully submit that the subject matter recited by claims 8, 29, and 30 is fully supported by the specification. Accordingly, Applicants respectfully request that the Examiner withdraw the Section 112, first paragraph, rejections of claims 8, 29, and 30.

Objections to the Specification

In the Final Office Action, the Examiner set forth several objections with regard to the specification of the present application. Applicants note that these objections generally allege that the specification fails to contain or support the subject matter set forth in claims 8, 29, and 30. *See* Final Office Action, pages 5-6. However in view of the arguments presented above in addressing the Examiner's rejection of claims 8, 29, and 30 under 35 U.S.C. § 112, first paragraph, Applicants submit that the specification fully supports the subject matter recited by these claims. As such, Applicants respectfully request that the Examiner withdraw the objections to the specification.

Claim Rejections under 35 U.S.C. § 103

In the Final Office Action, the Examiner cited a total of eight references in setting forth various grounds of rejection against the pending claims under 35 U.S.C. § 103 based upon obviousness. Due to the complexity of the present rejections (noting in particular that each claim was rejected based on a combination of at least four of the eight cited references), Applicants have provided the following summarized listing of the rejections below:

i. Claims 1-2, 23, 25, 27, and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, U.S. Patent No. 6,248,988 (hereinafter "Krantz") in view of Margulis et al., U.S. Patent No. 6,340,994 (hereinafter "Margulis"), in view of Platt et al., U.S. Patent No. 6,973,210 (hereinafter "Platt"), and further in view of Avinash, U.S. Patent No. 5,943,433 (hereinafter "Avinash");

ii. Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, Margulis, Platt, and Avinash, and further in view of Finger et al., U.S. Patent No. 6,015,385 (hereinafter "Finger");

iii. Claim 28 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, Margulis, Platt, and Avinash, and further in view of Lohmeyer et al., U.S. Patent No. 6,061,477 (hereinafter "Lohmeyer");

iv. Claims 8, 13, 16, 24, 26, 30, and 32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz in view of Avinash, in view of Desloge, U.S. Patent No. 7,254,199 (hereinafter "Desloge"), and further in view of Lohmeyer;

v. Claims 31 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, Avinash, Desloge, and Lohmeyer, and further in view of Finger;

vi. Claims 11-12 and 19-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, Avinash, Desloge, Lohmeyer, and Finger, and further in view of Margulis;

vii. Claims 14 and 34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, Avinash, Desloge, and Lohmeyer, and further in view of Margulis; and

viii. Claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Krantz, Avinash, Desloge, and Lohmeyer, and further in view of Delestienne et al., U.S. Patent No. 6,377,162 (hereinafter "Delestienne").

For at least the reasons presented below, Applicants respectfully traverse all of these rejections.

Legal Precedent and Guidelines

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why

one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

Moreover, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. That is, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959); *see* M.P.E.P. § 2143.01(VI). If the proposed modification or combination would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); *see* M.P.E.P. § 2143.01(V).

Additionally, non-analogous art cannot properly be pertinent prior art under 35 U.S.C. § 103. *In re Pagliaro*, 210 U.S.P.Q. 888, 892 (C.C.P.A. 1981). For the teachings of a reference to be prior art under 35 U.S.C. § 103, there must be some basis for concluding that the reference would have been considered by one skilled in the particular art working on the particular problem with which the invention pertains. *In re Horne*, 203 U.S.P.Q. 969, 971 (C.C.P.A. 1979). The determination of whether a reference is from a non-analogous art is set forth in a two-step test given in the case of *In re Wood*, 599 F.2d 1032, 1036, 202 U.S.P.Q. 171, 174 (C.C.P.A. 1979). *See also, e.g., Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 220 U.S.P.Q. 584 (Fed. Cir. 1984); *Bott v. Fourstar Corp.*, 218 U.S.P.Q. 358 (E.D. Mich. 1983). In *Union*

Carbide, the court noted that, under the *Wood* test, the first determination was whether "the reference is within the field of the inventor's endeavor." If it is not, one must proceed to the second step "to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved." In regard to the second step, the *Wood* court stated that "analogous art is that field of art which a person of ordinary skill in the art would have been apt to refer in attempting to solve the problem solved by a proposed invention." "To be relevant the area or art should be 'where one of ordinary skill in the art would be aware that similar problems exist'." *Bott*, 218 U.S.P.Q. at 368 (quoting *Stevenson v. ITC*, 204 U.S.P.Q. 276, 280 (C.C.P.A. 1979).

Independent Claims 1, 23, and 25

Independent claim 1, as amended, recites a method comprising, *inter alia*, "determining a desired sampling rate ... based at least partially on a point-spread function of the imaging system *or* the frequency content of the image data." (Emphasis added). This feature is also recited in amended independent claims 23 and 25, which are directed towards a system and a computer readable medium comprising encoded routines, respectively. As noted above, independent claims 1, 23, and 25 were rejected by the Examiner based on the combined teachings of the Krantz, Margulis, Platt, and Avinash references. In the previous Office Action, the Examiner relied on Krantz as allegedly disclosing the use of a point-spread function in determining a desired sampling rate. *See* Office Action mailed January 24, 2008, page 5. In the Response filed on April 22, 2008, Applicants noted that while Krantz does appear to briefly allude to a point-spread function of an imaging system, there is absolutely no indication whatsoever that the point-spread function is used in determining any type of sampling rate, much less a desired sampling rate. *See* Response filed April 22, 2008, pages 11-13. In the present Final Office Action, the Examiner appears to acknowledge the deficiencies of the Krantz reference, but further cited a new reference, Margulis, as allegedly disclosing the above feature. Specifically, the Examiner stated:

> Margulis et al., in [*sic*] analogous environment, teaches a system and method for using temporal gamma and reverse supper-resolutoin [*sic*] to process images for use in digital display systems,

> where determining the desired sampling rate (Nyquist sampling rate) (column 7, line 27-30), based upon on a point-spread function of the imaging system (column 16, line 39-41).
>
> Final Office Action, page 8.

However, after carefully reviewing the teachings set forth in Margulis, it does not appear that the cited reference teaches, suggests, or even hints that a point-spread function is used to *determine a desired sampling rate*, as alleged by the Examiner.

In setting forth the present rejection, the Examiner cited the following passage as allegedly disclosing the determination of a desired sampling rate:

> Consequently, ADC 3002, to properly sample the input for image reconstruction, runs at 100 MHz. ADC 3002 preferably uses Nyquist sampling to determine the appropriate sampling rate.
>
> Margulis, col. 7, lines 27-30.

In particular, the Examiner asserted the use of "Nyquist sampling" as being analogous to the recited "desired sampling rate." *See* Final Office Action, page 8. The Examiner further asserted that the determination of the Nyquist sampling rate, as taught by the Margulis reference, is based upon a point-spread function of an imaging system. *See id.* Specifically, the Examiner additionally cited a portion of the Margulis reference stating "[t]he spatial spread of the image due to the display system is characterized as the display system Point Spread Function (PSF)." Margulis, col. 16, lines 39-41. Based upon these cited passages, however, Applicants are unable to discern *any* teaching or suggestion that the Nyquist rate is determined based in any way whatsoever upon the point-spread function of an imaging system.

As the Examiner will appreciate, the discussion of Nyquist sampling in Margulis appears to relate to the utilization of the Nyquist sampling rate by an analog-to-digital converter (ADC) 3002 in determining an appropriate sampling rate for sampling and reconstructing analog signals into a digital image. *See id.* at col. 7, lines 18-26. Even assuming for the sake of argument that

the Nyquist sampling rate could be characterized as the recited "desired sampling rate," Applicants are unable to identify any teaching in Margulis which appears to even remotely suggest that the point-spread function of the display system is used to determine this Nyquist sampling rate. Instead, Applicants note that the passage relied upon by the Examiner as allegedly disclosing this recited feature appears to merely mention the point-spread function in the context of defining or characterizing the "spatial spread" of an image projected by the display system. *See id.* at col. 16, lines 22-41. In other words, to the extent that the Margulis reference briefly discusses Nyquist sampling and mentions a point-spread function, Applicants are unable to identify or locate any *explicit* teaching in the reference, nor has the Examiner provided any support, that the point-spread function is used to *determine a desired sampling rate*, as recited by independent claims 1, 23, and 25.

Thus, contrary to the Examiner's assertions, Applicants submit that the Margulis reference fails to teach, suggest, or even hint at the use of (1) a point-spread function of an imaging system or (2) the frequency content of an image for determining a *desired sampling rate*. Moreover, Applicants note that the Krantz, Avinash, and Platt references, which the Examiner cited in combination with Margulis, were not relied upon in this manner, and thus fail to obviate the above-discussed deficiencies. As such, Applicants submit that the proposed combination of these cited references cannot be construed as teaching, suggesting, or even hinting at the determination of a *desired sampling rate* based upon either a point-spread function or the frequency content of an image.

In view of the foregoing discussion, Applicants submit that no *prima facie* case of obviousness has been established with regard to independent claims 1, 23, and 25 based on the combination of the Krantz, Margulis, Platt, and Avinash references. Accordingly, Applicants respectfully request that the Examiner withdraw the Section 103 rejections of independent claims 1, 23, and 25, as well as those claims depending therefrom.

Dependent Claims 4 and 28

As stated above, the Examiner rejected dependent claims 4 and 28, each of which depend from independent claim 1, in view of the above-discussed combination of the Krantz, Margulis, Platt, and Avinash references, and further in view of one or more of the additionally cited Finger or Lohmeyer references. As noted above, the Krantz, Margulis, Platt, and Avinash references, alone or in combination, fail to disclose the use of (1) a point-spread function of an imaging system or (2) the frequency content of an image for determining a desired sampling rate, as recited by independent claim 1. Further, neither Finger nor Lohmeyer were relied upon by the Examiner in this regard, and thus each of these references fails to obviate the above-discussed deficiencies. As such, Applicants submit that no *prima facie* case of obviousness has been established with regard to claims 4 and 28. For at least these reasons, Applicants respectfully request that the Examiner withdraw the Section 103 rejections of dependent claims 4 and 28.

Independent Claims 8, 16, 24, and 26

Independent claim 8 recites, *inter alia*, "processing the image data by shrinking the input image defined by the image data based at least partially on the shrink parameter if the shrink parameter is greater than one." (Emphasis added). Independent claims 16 and 24 recite similar subject matter and are generally directed towards systems adapted to perform the method recited by independent claim 8. Independent claim 26 also recites similar subject matter and is directed towards a computer program stored on a computer readable medium including routines for carrying out the method of independent claim 8. In setting forth the rejection of independent claims 8, 16, 24, and 26 in the Final Office Action, the Examiner cited the combination of the Krantz, Avinash, Desloge, and Lohmeyer references. Specifically, the Examiner relied upon the Desloge reference as allegedly disclosing the shrinking of an image if a shrink parameter is greater than one. *See* Final Office Action, page 14. The relevant portion of the Desloge reference upon which the Examiner relies states the following:

> This research imposes the following modification upon the step-size in order to reduce the step size when the $\left|\hat{\beta}_{opt,i}[k]\right|^2$ are large:

$$\mu[k] = \frac{\alpha}{KE\left[\underline{X}^{H}\,\underline{X}\right]}, 0 < \alpha < 1, with$$

$$K = \max\left[1, \frac{\sum_{i=1}^{M-1}\left|\hat{\beta}_{opt,i}[k]\right|^{2}}{M-1}\right].$$

In this case, the parameter K is restricted to be greater than 1 to ensure that it only shrinks and never enlarges $\mu[k]$.

Desloge, col. 35, line 60 – col. 36, line 10.

After carefully reviewing the Desloge reference, Applicants submit that even if the parameter "K" could be characterized as a shrink parameter, the Examiner's proposed combination of Desloge with the Krantz, Avinash, and Lohmeyer references is improper because the Desloge reference constitutes non-analogous art.

Request Removal of the Desloge Reference as Non-Analogous Art

As summarized above, the determination of whether a reference is from a non-analogous art is set forth in a two-step test applied in *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 220 U.S.P.Q. 584 (Fed. Cir. 1984). In *Union Carbide*, the court found that the first determination was whether "the reference is within the field of the inventor's endeavor." If it is not, one must proceed to the second step "to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved."

Based on the foregoing two-part non-analogous art test, Applicants submit that the Desloge reference does not qualify as analogous art. In regard to the first step of the *Wood* test, the Applicant stresses that the Desloge reference is clearly not in the field of the Applicant's endeavor. Particularly, the present application is directed to the field of digital imaging. *See* Application, page 1, lines 5-9. In stark contrast, the Desloge reference is directed to the field of signal processing with regard to beamforming transducer arrays, such as radar, sonar, satellites,

hearing aids, antennas, and microphones. *See* Desloge, col. 1, lines 20-30. Applicants do not believe that digital imaging systems and beamforming transducer arrays could reasonably be considered as being within the same field of endeavor.

Further, in regard to the second step of the *Wood* test, i.e., the pertinence of the cited reference to the problem addressed by Applicants, the present application is generally concerned with the problem of filtering images to remove random noise while taking into account the inherent spatial resolutions of an input image. *See* Application, page 2, lines 1-5. Particularly, in addressing the problem faced by the inventors, the present application states:

> Current imaging systems produce images of differing spatial resolutions. A parameter known as the point-spread function of the systems is largely dependent upon imaging parameters, and results in such differing spatial resolutions. In CT images, for example, the particular reconstruction algorithm used to convert the acquired data to image data primarily determines the extent of the point-spread function. In MRI systems, similarly, the amount of zero-filled interpolation in the k-space data (the data acquired during an imaging sequence) affects the spatial extent of the point-spread function. In X-ray systems, the distance between the source and detector determines the point-spread function of the system.
>
> Image filtering algorithms aimed at removing random noise from images do not currently account for this variation in the inherent spatial resolution. Accordingly, such algorithms perform sub-optimally in terms of image quality. *In such frameworks, a loss of spatial resolution in the filtered image often results, even as they may successfully reduce levels of random noise.*
>
> *There is a need, therefore, for an improved technique for filtering digital images. There is, at present, a particular need for a technique that can be used in different contexts and to account for a different point-spread function bases.*
>
> *Id.* at page 1, line 11 – page 2, line 9. (Emphasis added).

In sharp contrast, Applicants note that the Desloge reference is primarily concerned with problems in the field of beamforming transducer arrays, and particularly with techniques for

enhancing a target source relative to background noise in the context of beamforming transducer arrays. One example discussed in Desloge relates to hearing aid devices. Specifically, the Desloge reference notes that "[h]earing aid wearers often complain about the corrupting influence of background noise upon their ability to understand a desired target source. Enhancing the target relative to the background noise reduces this problem." Desloge, col. 1, lines 36-41. The Desloge reference further summarizes the overall goal of beamforming as "extract[ing] a desired target signal from within a field of non-target, jammer signals using an array of spatially-separated sensors." *Id.* at col. 1, lines 50-52. In particular, the Desloge reference generally addresses the foregoing problem using a Location-Estimating, Null Steering (LENS) algorithm. Further, even assuming that the parameter "K" disclosed in the Desloge reference could be characterized as a shrink parameter, Applicants note that this parameter appears to apply to the shrinking or enlarging of a step-size parameter associated with an "iteration convergence" factor in a beamforming process, and does not appear to relate in *any way* to the shrinking of images. *See, e.g., id.* at col. 35, lines 39-55. In fact, Applicants are unable to locate any passage in the Desloge reference that even mentions images, much less digital images.

With the foregoing points in mind, Applicants respectfully assert that the problems addressed by the Desloge reference are completely different from those encountered in the field of digital imaging and that one of ordinary skill in the art would not likely turn to the beamforming industry to solve problems faced by digital imaging systems. In summary, the Desloge reference simply is not reasonably pertinent to the problem faced by Applicants. Moreover, Applicants submit that the Examiner has not met his burden, and in fact has failed to provided any rationale as to why one skilled in the art concerned with the shrinking of images while maintaining image quality and spatial resolution would have thought to consider a reference directed to beamforming other than asserting the conclusory statement that "[i]t would have been obvious … to use the system of Desloge … in the system of Krantz, in order to have a robustness control mechanism whish [*sic*] yields a system that has direct and flexible control over the beamforming process." Final Office Action, page 14. Still further, the Examiner has not provided any logical rationale as to why the Desloge reference would have commended itself to Applicants' attention. *See Wang*

Laboratories, Inc. v. Toshiba Corp., 993 F.2d 858 26 U.S.P.Q.2d 1767 (Fed. Cir. 1993) (noting that a reference is reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention considering his problem). Additionally, the Examiner has also failed to provide a compelling argument as to why one skilled in the art would even be aware that similar problems exist in the exceedingly disparate fields of digital imaging systems and beamforming transducer arrays. *See Bott*, 218 U.S.P.Q. at 368. For at least these reasons, Applicants submit that the Desloge reference must be considered non-analogous art. Consequently, Applicants respectfully request removal of the Desloge reference from consideration.

Features Omitted from Independent Claims 8, 16, 24, and 26

As noted above, the Examiner various rejections of independent claims 8, 16, 24, and 26 are based upon the mistaken assumption that the Desloge reference could be properly characterized as analogous art with respect to the present application. In particular, the Examiner relied solely upon Desloge for the teaching of a shrink parameter being greater than one. Thus, upon the proper removal of this reference from consideration, the remaining art fails to establish a *prima facie* case of obviousness with respect to independent claims 8, 16, 24, and 26, or their respective dependent claims. For at least these reasons, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 103 and allowance of independent claims 8, 16, 24, and 26.

Improper Combination: Krantz teaches away from Avinash and Lohmeyer

Notwithstanding the removal of the Desloge reference as non-analogous art, Applicants further assert that the Examiner's combination of the Krantz reference with either or both of the Avinash or Lohmeyer references is improper because the Krantz actually teaches away from Avinash and Lohmeyer. As an initial matter, Applicants note that this point was addressed in the previous Response filed on April 22, 2008. *See* Response filed April 22, 2008, pages 18-20. In particular, Applicants note that the passage in Krantz upon which the Examiner relied in the previous Office Action as allegedly disclosing a desired pixel sampling rate states:

> Tiziani et al., in J. Mod. Opt. 43, 144 (1996) disclose a chromatic confocal microscope using a microlens array objective producing multiple confocal imaging spots on a CCD detector and is intended for topometry. However, for imaging purposes this approach is limited by the optical performance of the microlens array, in particular the numerical aperture (NA)--aberration tradeoff preventing small spot sizes for high resolution, the limited working distance at large NA, and *insufficient sample compared to Nyquist's theorem.*
>
> Krantz, col. 3, lines 17-26 (emphasis added).

Based on Applicants' best understanding of how the Examiner interpreted the cited passage in the previous Office Action, it appeared that the Krantz reference, at best, discloses an image having an actual sampling rate being *less* (*e.g.*, insufficient) than a desired sampling rate, which the Examiner has correlated to the Nyquist sampling rate in accordance with Nyquist's theorem. However, as one skilled in the art will readily appreciate, when the sampling rate of an image is *less* than an optimal sampling rate, such as the Nyquist sampling rate, it *would not* be desirable to shrink the image. For instance, the application of a shrinking operation to an image that is *already* under-sampled (*e.g.*, sampled at less than the Nyquist rate) may result in loss of image data in the resulting shrunken image. Accordingly, Applicants noted that even if the Krantz reference was hypothetically modified to further include the shrinking operations disclosed in the Avinash and Lohmeyer references, the resulting shrunken images of Krantz would be under-sampled and would not be suitable or satisfactory for use in the imaging acquisition system in accordance with the teachings of Krantz and, therefore, contrary to the Examiner's assertions, one skilled in the art would not find it obvious to combine the teachings of the Krantz reference with image shrinking techniques disclosed by the Avinash and Lohmeyer references.

In the Final Office Action, the Examiner expressed disagreement with Applicants' position, stating that the discussion of an image having insufficient sampling compared to Nyquist's theorem actually related to prior art (Tiziani et al.) that was referenced in the "Background Art" section of the Krantz reference. *See* Final Office Action, page 3. The Examiner further stated:

> ...nowhere in the Krantz invention [is it] stated that the actual sampling rate [is] less than a desired sampling rate. Furthermore, Krantz clearly states in the object of his invention the providing of high resolution, high efficiency, high speed confocal and conventional microscope imaging system suitable for defect inspection and review, particularly one whose architecture is scalable to smaller pixel size, and greater field size and data rates.
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> *Id.* at pages 3-4. (Emphasis in original).

Applicants respectfully disagree and submit that the Examiner has failed to demonstrate why Krantz does not teach away from the Avinash or Lohmeyer references.

Although Applicants do not dispute that the passage originally cited by the Examiner as teaching a Nyquist sampling rate (alleged to be the recited "desired sampling rate") does appear to be referencing a prior art reference, Tiziani, Applicants note that the cited passage was the *sole* passage relied upon by the Examiner throughout the previous Office Action as allegedly disclosing the recited "desired sampling rate." *See* Office Action mailed January 24, 2008, pages 3 and 7. Indeed, even in the current Final Office Action, the Examiner has continued to rely on the above-quoted passage of Krantz as allegedly disclosing the comparison of an actual sampling rate to the recited desired sampling rate. *See, e.g.*, Final Office Action, pages 4 and 8. Further, it appears that the Examiner's only justification in asserting that Krantz does not teach away from either the Avinash or Lohmeyer references is that the invention set forth in Krantz provides for "greater field size and data rate." *Id.* at page 4. (Emphasis original). Applicants respectfully disagree and submit that the reasoning offered by the Examiner fails to provide a convincing reason as to why Krantz discloses anything other than an image having an insufficient sampling rate compared to Nyquist. In particular, Applicants submit that the use of a larger field size, as noted by the Examiner, would actually provide for enlarged images, not shrunken images. For at least these reasons, Applicants respectfully request that the Examiner either withdraw the rejections which rely on the combination of Krantz with either Avinash or Lohmeyer, or provide some sound line of reasoning as to why Krantz does not teach away from the Avinash or Lohmeyer references.

Dependent Claims 11-12, 19-20, 22, 31, and 33

Claims 11-12, 19-20, 22, 31, and 33 each depend from either claims 8 or 16, and were rejected by the Examiner based on the combination of the Krantz, Avinash, Desloge, and Lohmeyer references, as discussed above, and further in view of one or more of the additionally cited Finger, Margulis, or Delestienne references. As discussed above, however, the Desloge reference is believed to constitute non-analogous art and, therefore, cannot be properly relied upon in setting forth the present rejection. Moreover, without the Desloge reference, the Krantz, Avinash, and Lohmeyer references fail to disclose all the elements recited by independent claims 8 and 16. Particularly, these references fail to teach or suggest the shrinking of an image if a shrink parameter is greater than one. Applicants further note that the Finger, Margulis, and Delestienne references were not relied upon by the Examiner in this regard, and thus each of these additional references fails to obviate the above-discussed deficiencies. As such, Applicants submit that no *prima facie* case of obviousness has been established with regard to claims 11-12, 19-20, 22, 31, and 33. For at least these reasons, Applicants respectfully request that the Examiner withdraw the Section 103 rejections of dependent claims 11-12, 19-20, 22, 31, and 33, and allow these claims.

Dependent Claims 14 and 34

Claims 14 and 34 depend from claims 8 and 16, respectively, and each generally recite determining a desired sampling rate based at least partially on a point-spread function of the imaging system or the frequency content of image data. In rejecting claims 14 and 34, the Examiner acknowledged that the combination of the Krantz, Avinash, Desloge, and Lohmeyer references fails to disclose this feature, but asserted that the Margulis reference overcomes this deficiency. However, as discussed above with regard to the rejections of independent claims 1, 23, and 25, to the extent that Margulis mentions a point-spread function, there is absolutely no teaching or suggestion in the reference that the point-spread function is used in any way to derive a Nyquist sampling rate, which the Examiner correlated to the recited "desired sampling rate." Accordingly, no *prima facie* case of obviousness is believed to exist with regard to claims 14 and

34. As such, Applicants respectfully request withdrawal of the Section 103 rejections and allowance of dependent claims 14 and 34.

Conclusion

In view of the remarks set forth above, Applicants respectfully submit that all pending claims are now in condition for allowance. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: October 14, 2008

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